

McPeak  
Lecture 5  
PPA 723

Consumer choice.

Model premises;

- 1) Tastes for a consumer are given. They may vary across consumers, but for our purposes, are treated as fixed for a given individual. We don't really care where they came from.
- 2) There are constraints on the choices an individual can make, either through regulation or budget limits.
- 3) The consumer makes choices that maximize their well-being.

The goal is to understand and predict behavior.

Very flexible, very broad.

How does a consumer choose one bundle of goods over another?

We assume they are guided by their preferences.

Preferences obey three properties by assumption.

- 1) Completeness. For any two bundles of goods, call them bundle A and bundle B, one and only one of the following statements is true:
  - a. A is preferred to B
  - b. B is preferred to A
  - c. The consumer is indifferent between A and B.

[meaning, no “I dunno’s”]

- 2) Transitivity. Preferences are logically consistent. If I prefer bundle A to bundle B, and prefer bundle B to bundle C, then I also prefer bundle A to bundle C.

[meaning, if I prefer cranberry juice to orange juice, and orange juice to apple juice, then it is safe to assume I prefer cranberry juice over apple juice]

- 3) More is better than less. Assume the commodity in question is a “good” rather than a bad, and that there is free disposal if all else fails.

[meaning, if you see me drinking cranberry juice, it is fair to assume that another glass will make me no worse off if I can consume it, give it to somebody, or pour it down the sink]

With these three assumptions, we can proceed to map a consumer's preferences.

First, if we are given a point that corresponds to a consumption level of two goods (our bundle if composed of two goods), we can partition space to tell us where the consumer is better off, where the consumer is worse off, and where we need to know more info.

Graph here.

We can put more precision on preference maps through the use of indifference curves. These tell us the different combinations of the two goods in question that make the consumer equally well off. The consumer is indifferent between any of the bundles that define the line – hence the name.

Indifference curves are the contours on our “map of happiness”. Each traces out a line that tells us consumption bundles that take us to the same “happiness height”.

Indifference curve properties:

- 1) Bundles on a curve further from the origin (consumption bundle equals zero for both goods) are preferred to those on curves closer to the origin.
- 2) There exists a curve passing through every bundle.
- 3) Indifference curves can not cross.
- 4) Indifference curves slope downward (and for our purposes are convex to the origin though this last bit need not hold).

Draw indifference curve.

The slope of the indifference curve is defined as the marginal rate of substitution.

This tells us the maximum amount of one good the consumer will sacrifice to obtain one more unit of the other good.

The trade off for a marginal increase in one good in terms of a marginal decrease in the other.

$$\text{MRS} = \frac{\Delta X_2}{\Delta X_1}$$

(assuming rise is measured in good two, run in good one).

What sign should this have?

We assume indifference curves are convex to the origin, reflecting a diminishing marginal rate of substitution. The less you currently are consuming of a good, the more valuable an additional unit is to you. More on this in a moment.

$$\text{MRS} = \frac{\Delta \text{rice}}{\Delta \text{beans}}$$

What does the indifference curve for perfect substitutes look like? [price chopper milk, byrne dairy milk]

Graph.

What does the indifference curve for perfect complements look like? [left glove, right glove]

Graph.

Most things fall in between.

Utility. A numerical value that reflects the relative ranking of various bundles of goods.

How many “utils” of happiness does a given market bundle give you?

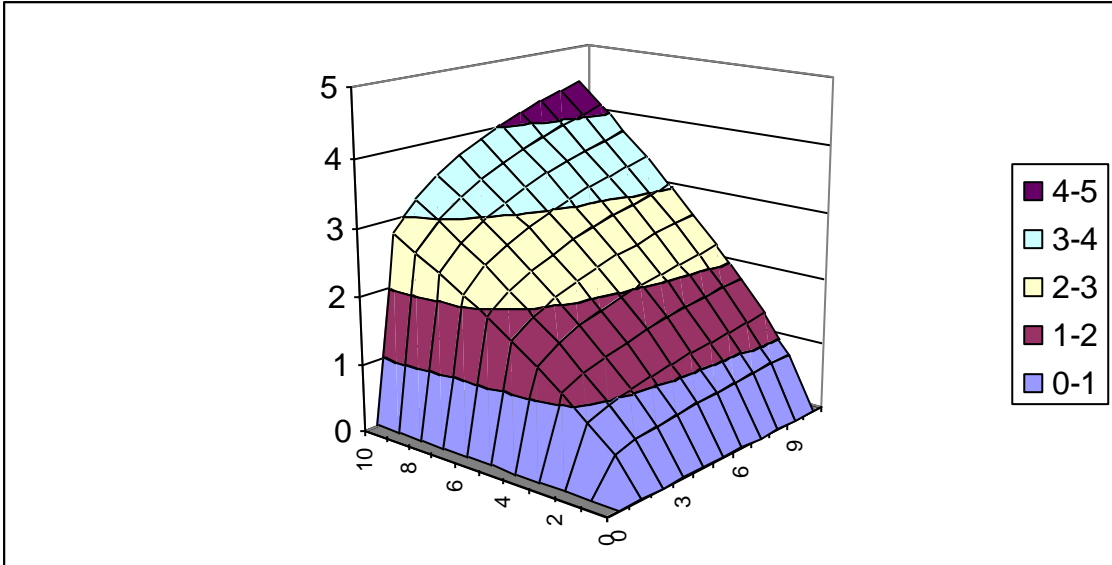
Ordinal, rather than cardinal, which means the absolute number of utils and the distance in utils between two bundles is not meaningful in and of itself. It orders the bundles.

Utility is often represented by a utility function, and we assume utility is concave to the origin.

Utility in two goods has three axes to be concerned about: good one, good two, and the utility derived from the combination of the goods. For example:

$$U = \left(\frac{1}{2}\right) \cdot (x_1)^{\frac{3}{4}} \cdot (x_2)^{\frac{1}{5}}$$

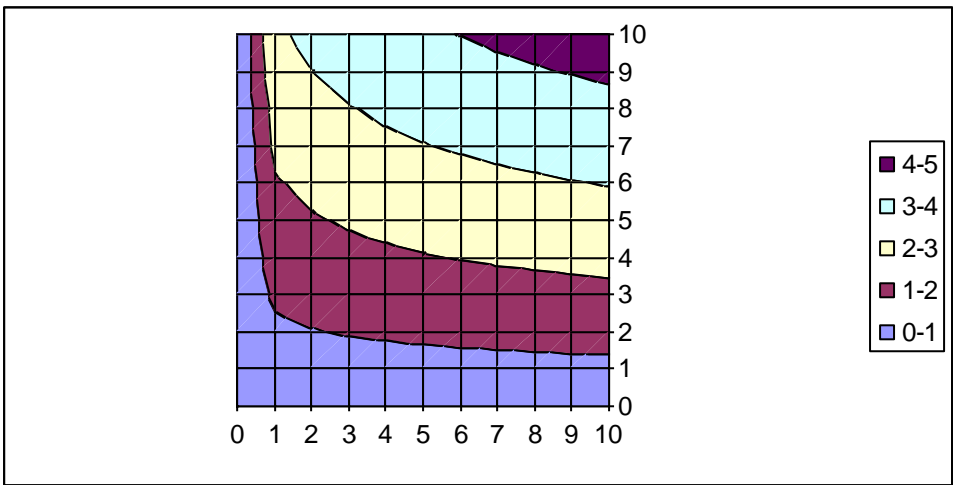
For  $x_1$  from 1 to 10, and  $x_2$  from 1 to 10



3-d view looks like a wedge from an upside down bowl.

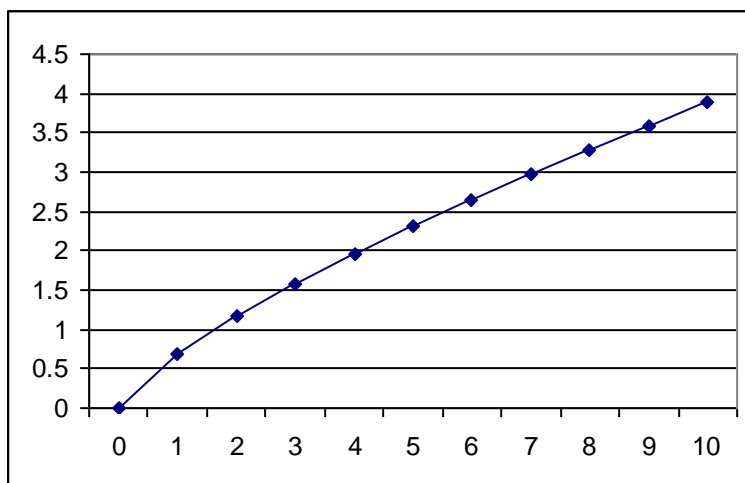
Note the contours, that is like the indifference curve.

View from above: (excel puts the label on the rhs, but same idea here).



This makes it easy to pick out the indifference curve shape.

If we pick one value of good one and consider how utility changes as we increase good two, we get something like this (using the info in the surface map).



(side view of utility function, hold other good constant)

Utility increases as we consume more of the good, but it is assumed by a decreasing rate. Decreasing marginal utility.

Distinguish between decreasing utility and decreasing marginal utility.

From 0 to 1, utility increased by 0.7.

From 1 to 2, utility increased by 0.5.

From 2 to 3, utility increased by 0.4.

Marginal utility:  $\frac{\Delta U}{\Delta X}$  Note that this is assumed positive.

The marginal rate of substitution (MRS) is equal to the negative of the ratio of the marginal utilities.

$$\text{MRS} = \frac{\Delta x_2}{\Delta x_1} = - \frac{\text{MU}_{x_1}}{\text{MU}_{x_2}}$$

At some level, you just have to accept this.

$\Delta U = \Delta x_1 \cdot \text{MU}_{x_1} + \Delta x_2 \cdot \text{MU}_{x_2}$ , but change in Utility = 0 on an indifference curve, so rearrange terms.

For a more detailed explanation, see the following.

From a calculus point of view, it makes sense:

$$U = U(x_1, x_2)$$

The total derivative:

$$dU = (dU/dx_1)dx_1 + (dU/dx_2)dx_2$$

If we move along an indifference curve, we know that  $dU=0$ , so that:  $(dU/dx_1)dx_1 - (dU/dx_2)dx_2$  and we rearrange terms from there.

However, we don't have that calculus option, so my best intuitive try here:

Take yourself back to the 3-d graph.

If we change  $x_1$  positively, it will have a positive impact on utility (change in  $x_1$  moves us sideways, but also up). If we want to get back down to the utility level we started at, we need to change  $x_2$  negatively, until it moves us back down on utility (change in  $x_2$  moves us sideways, but also down). So loosely stated, we have to balance the total impact of the change  $x_1$  had on us in 3-d space by changing  $x_2$  enough to bring us back down to the same utility level as we started at, but at a different consumption bundle.

## Budget constraints.

Assume away savings and dynamic aspects, and to keep things simple, assume that the budget constraint is the income received in a given period.

Now we have two goods, so let's define  $Y$  as income,  $p_1$  as the price of good one,  $x_1$  as the quantity of good one consumed,  $p_2$  as the price of good two, and  $x_2$  as the quantity of good two consumed.

$$p_1 * x_1 + p_2 * x_2 = Y$$

The budget line/ budget constraint.

The plot of all possible combinations of goods  $x_1$  and  $x_2$  that can be purchased at given levels of  $Y$ ,  $p_1$  and  $p_2$

The opportunity set is all bundles on or below the budget line.

$$Y=100, p_1=10, \text{ and } p_2=5$$

$$p_1 * x_1 + p_2 * x_2 = Y$$
$$10 * x_1 + 5 * x_2 = 100$$

$$\text{Max } x_1 = (Y / p_1) = (100 / 10) = 10$$

$$\text{Max } x_2 = (Y / p_2) = (100 / 5) = 20$$

Draw this, note opportunity set.

Slope? Change in  $x_2$  / change in  $x_1 = -20 / 10 = -2$

Or

$$-p_1 / p_2, -10 / 5 = -2.$$

Why?

As graphed,  $x_2$  is a function of  $x_1$ . So we can write:

$$x_2 = (Y / p_2) - (p_1 / p_2) * x_1$$

$$x_2 = (100 / 5) - (10 / 5) * x_1$$

The marginal rate of transformation is the slope of the budget line. It reflects the trade offs the market imposes on the consumer in terms of the amount of one good the consumer must give up to obtain more of the other good.

What is the impact of a change in price on the budget line?  
If price of good one increases from 10 to 20. Slope is now -4.

$$20 * x_1 + 5 * x_2 = 100$$

Draw.

What is the impact if the price of good one decreases to 5 from 10? Slope is now -1.

$$5 * x_1 + 5 * x_2 = 100$$

Draw.

What is the impact of a change in income on the budget line?

$$10 * x_1 + 5 * x_2 = 150$$

Income goes to \$150 from \$100. Does this change the slope? No – outward shift.

What happens to the budget line if income doubles? What happens if the price of all goods is halved? Takes you to the same place.

$$10 * x_1 + 5 * x_2 = 100$$

$$10 * x_1 + 5 * x_2 = 200$$

$$10 * x_1 + 5 * x_2 = 100$$

$$5 * x_1 + 2.5 * x_2 = 100$$